

Preventing Scientific Misconduct: Insights from “Convicted Offenders”

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Keywords: Equity theory, Prevention, Rationalization techniques, Research misconduct, Responsible conduct of research, Scientific misconduct

The mere seriousness of certain social behaviors implies the need to prevent them. In the case of conventional crime, for example, survivors of homicide victims or the victims of physical or sexual assault, when asked what they want most, often will say they wish the incident had never happened. For them, a successful homicide prosecution does not bring back the lost loved one. A long prison term for the rapist will not restore the victim to the state she enjoyed prior to the crime. As a result, we strive to identify and implement various ways of reducing opportunities for both offending and victimization.

Although the perceived harm in research misconduct may not be as great as in violent crime, its consequences nevertheless can have disastrous and far-reaching effects. After-the-fact measures such as the investigation of allegations and the sanctioning of the guilty, while necessary for justice and the vindication of the moral order, seldom can undo the harm caused by each instance of fabrication, falsification, plagiarism, or other serious departure from the norms of science. The retraction of a published paper cannot restore the time wasted by other investigators pursuing pointless lines of research or by editors and referees reviewing meaningless results. An apology and a signed voluntary consent agreement by one found guilty of research misconduct does not automatically lift the taint from the supervisor and colleagues in whose lab the misconduct occurred. And for those who suffer from life-threatening diseases and consequently hold out hope for a cure, the broken trust of falsified clinical trials has far more devastating effects. To be sure, the shock waves emanating from a single incident of research misconduct can create untold collateral damage, including the tarnishing of reputations of scientists, institutions, and of the enterprise of science itself.

In view of our collective inability to undo the damage and effect restoration to all parties in these cases, the prevention of research misconduct is a desirable end. The question then becomes, what can the scientific community do to keep research misconduct from occurring in the first place? The purpose of this preliminary analysis is to explore largely untapped data sources in order not only to advance theoretical work in this area, but also to glean information of practical import.

In order to tackle the challenge posed by prevention, we must acknowledge that prevention can occur at more than one level. Douglas Weed, employing public health's notions of primary and secondary prevention, suggests that we first need to know something about etiology, and he argues that there are causal factors both internal and external to the scientist who engages in research misconduct (1). Examples of internal causal factors would include psychological problems, financial motivations, or perhaps the desire to hurt others. Causes external to the scientist, on the other hand,

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are factors such as the pressure to publish, inadequate training or supervision, or the fierce competition for research grants.

In either case, successful prevention requires that we somehow interrupt one or more processes that lead to an instance of research misconduct. For example, if we knew that individual psychopathology was responsible for research misconduct, we perhaps could administer the Minnesota Multi-phasic Personality Inventory (MMPI), the Narcissistic Personality Inventory, the Psychopathy Checklist, or other psychometric tools to help us screen out applicants who were predisposed to engaging in unethical research practice. In an effort to address an external cause such as inadequate supervision, we might institute regular meetings between lab supervisors and their staff members.

Objectives

This pilot study focuses on two individual-level explanations for research misconduct. First, Cressey's research on embezzlement in financial institutions was examined (2). Cressey's subjects, who largely perceived themselves to be respectable people, had three characteristics in common:

1. A non-shareable financial problem, for example, one the individual could not discuss without suffering humiliation;
2. An awareness the problem could be solved by violating the position of financial trust; and
3. Suitable rationalizations for the embezzlement of funds to resolve their self-conception as a trusted person.

Applying Cressey's work to scientific researchers, is it possible that some have non-shareable problems, not necessarily financially-based, which motivate them to engage in research misconduct? The possibilities could include the inability to produce replicable work under pressure, a perceived lack of talent for research, or personal problems such as marital or emotional difficulties. For example, William Summerlin, the protagonist in one of the best-known cases of research misconduct, intimated that he had been under a lot of pressure from the head of the lab to produce results. Could the inability to withstand this sort of pressure constitute a non-shareable problem?

In addition to possibly having such non-shareable problems, how do researchers who

engage in misconduct formulate rationalizations for their behavior? And what form might these rationalizations take? Sykes and Matza, in their research on juvenile delinquency, discuss several of what they refer to as "techniques of neutralization" including (3) :

- *Denial of a victim* (Who am I really hurting by fudging these data?)
- *Denial of an injury* (What is the harm?)
- *Condemnation of the condemners* (They're out to get me.)
- *Denial of negative intent* (I never meant to hurt anyone.)
- *Metaphor of the ledger* (For most of my time here in the lab I've been a hard-working, loyal employee. I'm entitled to a slip or two. All in all, I've done more good than bad.)

Is it possible that individuals who commit research misconduct may employ one or more of these techniques in order to justify their conduct?

The second perspective employed for this study was social psychology's equity theory, which speaks to perceived fairness in dyadic relationships (4). Equity theory is exemplified in the common phrases "You scratch my back and I'll scratch yours" and "One good turn deserves another." Social beings have come to expect reciprocity when dealing with others. If people perceive they are getting less from a relationship than they are given, they may suffer distress. It is common, then, for the ostensibly exploited person to take measures to relieve this distress and restore a sense of equity. In the case of research misconduct, scientists may be more likely to engage in misconduct if they believe they were deprived of what was rightfully theirs, such as the co-authorship on a publication or a coveted promotion. Accordingly, individuals may engage in scientific misconduct as a form of retaliation against a coworker or supervisor if they believe that they have been slighted or exploited.

Design

Two sources of data were gathered for this study. The first was information from the case files of individuals against whom a finding of scientific misconduct was made by the Office of Research Integrity (ORI). A standard data collection form was used to record data including the institution, type of alleged misconduct, information from the respondent, response of the institution, and finding by the ORI. A member of the research

team read each case file and wrote narrative responses to the items on the data collection form summarizing information primarily pulled from the investigative reports by the universities and from the investigative reports of ORI and its predecessors. These narrative responses were analyzed for this part of the study. A total of 21 case files were reviewed for the initial pilot study. These case files included 16 cases reviewed as part of a pretest, as well 5 additional cases that included cases closed prior to the formation of the ORI, i.e., these cases were handled by the Office of Scientific Integrity (OSI), ORI's predecessor.

The second source of data consists of interviews with scientists against whom a finding of scientific misconduct was made by the ORI. Subjects who were included in the first nine case files used as part of the pretest comprised the sample for this portion of the data collection process. Because some scientists approached could not be located or were unwilling to participate in the interviews, only three out of the nine contacted were interviewed. It is possible that the experience of having been accused and found guilty of research misconduct was so unpleasant that some subjects have little interest in dredging up the past. One scientist who declined to participate in the study summed up his feelings in an e-mail to the senior author:

"I am very sorry to disappoint you but after more then ten years I have no inclination to discuss this issue with anybody. With my very poor English I found it useless to talk about the inquisition. I have no idea what is a (sic) subject and goal of your research, but I wish you a (sic) success in your work in the name of justice, science and humanity."

One of the interviewees summed up his feelings more bluntly when thanked for his time:

"The time is not the problem; it's the pain of having to relive this crap."

The researchers signed a confidentiality agreement with ORI to protect sensitive case file information. The researchers also took additional steps to ensure confidentiality during the data collection process, by excluding the subjects' name and case file number from the data collection instruments. Subjects were identified by the assignment of a subject number. To match files with subjects being interviewed, a list including the subject name, institution, ORI case number, and subject number was created. The information was only used to link interview

subjects with the case file reviews. Upon completion of the interviews, the subject list was given to ORI. Both data collection instruments were approved by an Institutional Review Board and by the U.S. Department of Health and Human Services, Office for Protection from Research Risks.

Methods of Analysis

Because theoretical work on scientific misconduct is relatively meager, we chose to use a qualitative approach borrowed from phenomenological psychology. Rather than first searching for evidence of specific theories or propositions, the investigator examines the data more for "explication" than explanation (5). This results in the listing and preliminary grouping of terms or phrases revelatory of, in this case, etiology. As a check against possible bias created by prior knowledge or other factors, the analyst extracts exact phrases rather than interpreted concepts. Another analyst approaches the data in the same way, identifying exact wording to convey possible sources of causation. The second step involves the two analysts coming together to compare and reconcile their lists. In the third step, the analysts group the phrases into common themes or constructs. Finally, the constructs are examined to see if they relate back to the selected theoretical approaches in order to help us interpret and discuss the relevance of these constructs or central themes in explaining the etiology of research misconduct. For example, in looking at Cressey's notion of the non-shareable problem (6), the analyst would group together those extracted phrases suggesting such themes as psychological issues, marital difficulties, financial pressure, lack of knowledge, difficulty with expectations of a supervisor, lack of supervision, or other problems an individual might reasonably be uncomfortable sharing with others.

Data obtained from the case file reviews and from the interviews eventually will be content analyzed using the QSR-NUDIST software. Content analysis is a means of systematically analyzing textual information to find recurring themes, issues, and motifs, which can then be isolated, counted, and interpreted (7, 8). If the appropriate statistical criteria are met, the data will also be analyzed to examine relationships among variables in order to assess, for example, if a certain type of misconduct or rank is

associated with the existence of a non-shareable problem.

The Sample

The data collected was part of a pilot study to test the efficacy of the data collection instruments developed, which were then used as part of a larger study examining all individuals against whom a finding of scientific misconduct was made by the ORI as of December 2000. A total of 21 case files were reviewed for the pilot study. Many of the respondents held academic positions as either Senior Faculty or Junior Faculty (each

category included 8 out of the 21 subjects). Senior Faculty included professors, associate professors, and directors/heads of departments, institutions or clinics. Junior Faculty is defined as assistant professors, postdoctoral students, research fellows and residents. Other researchers, including research associates, predoctoral students, and administrative assistants, made up the remaining positions (5 out of 21). It should be noted that tenure status could not be gleaned from the case files.

With respect to the types of research misconduct committed by these 21 respondents, 38% of the cases were for plagiarism, 19% were for fabrication, and 19% were for falsification. Fabrication/falsification made up 14% of the cases, and the remaining 10% were for a combination of falsification, fabrication, and plagiarism.

Results

Data from the case files reviewed were analyzed using the qualitative phenomenological approach.

Etiology

The systematic search for possible etiological factors related to our two theoretical perspectives yielded data in support of both

theories. Phrases or elements extracted from the case files showed evidence of non-shareable problems such as publish-or-perish pressure, lack of knowledge or experience, difficulty with supervisor's expectations/lack of supervision, and personal problems. These phrases were usually extracted from information contained in the University investigative reports or the

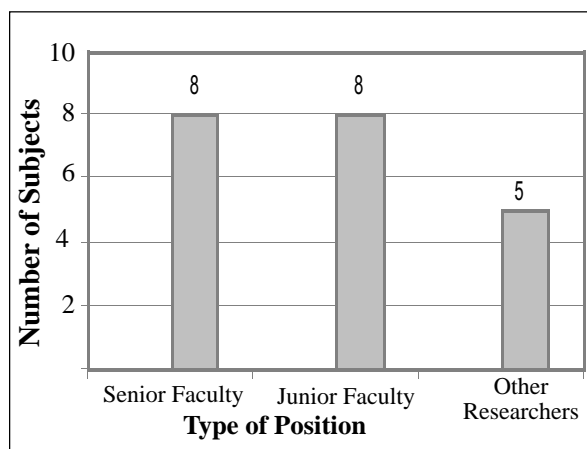


Fig. 1. Researcher's Academic Position

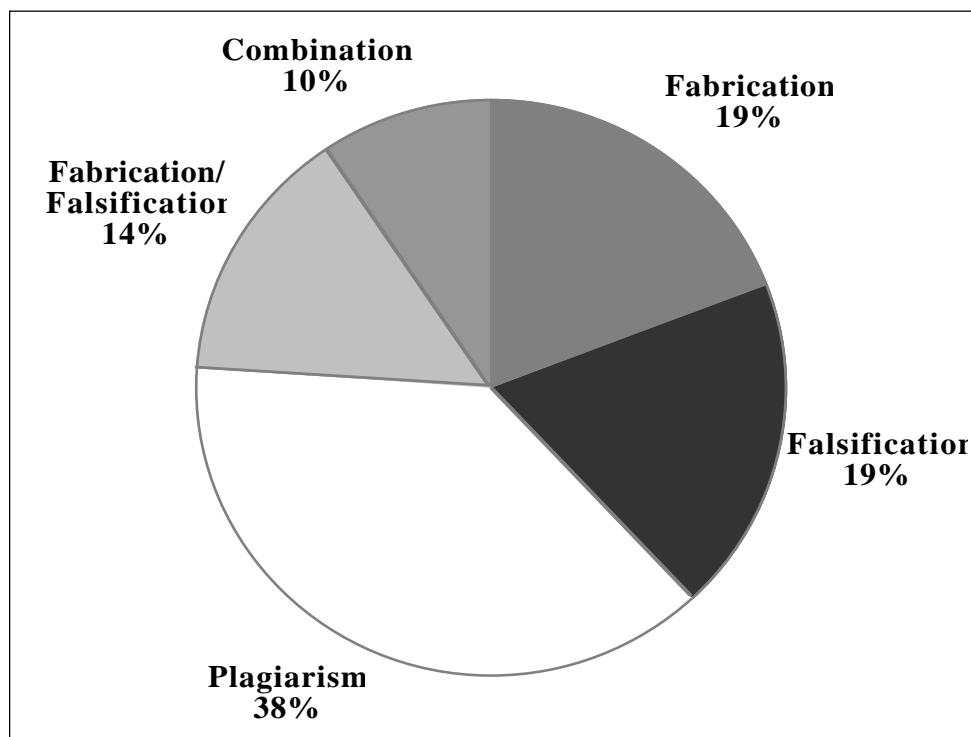


Fig. 2. Classification of Research Misconduct

Job Pressure	Lack of Subject Matter Knowledge	Personal Problems	Problems with Supervision
Enormous pressure to produce/ Pressure to produce by supervisor	Understanding of grant application process/First proposal	Personal insecurity	Could not fully satisfy the expectations of the supervisor/ If supervisor had more realistic expectations this incident might never had occurred
Time factors - short deadlines/ Short cut to save time	Different interpretation of the normal modes of responsible authorship	Personal/Family difficulties	Supervisor was demanding in research results
Pressure to keep the system working	Understanding of the principles of attribution in review articles	Medical illness	Lacked proper scientific guidance from supervisor/ Unsupervised
Insecure position	Not able to handle position/ Saddled with responsibilities which in hindsight were out of proportion to subject's training and experience		Under personal pressure from supervisor to publish data in order to secure a research position.
Isolated laboratory with few peers to discuss situation or possible career alternatives	Never trained in appropriate record keeping		Negligent oversight/ Deficiencies in oversight/ Supervisor's oversight was inadequate
Difficult job situation/ Stressful job situation			

Table 1. Etiology - Non-shareable problem

investigative reports from ORI; therefore, the information is hearsay, as the actual statements made by the respondent or other interested parties were usually not contained within the case files.

Information obtained from the interviews also provided evidence in support of a non-shareable problem by the respondent, which may have contributed to his misconduct. For example, one interviewee stated:

"How am I going to get a position where I don't have to worry every 2-3 years about if I don't get my grant I'm gonna be out on the street. This feeling of being a second, kind of a second class citizen. Um, the pressures to produce papers. And, you know, it was, I knew I was doing something wrong, but I reached a point where I didn't care."

The data also contained summarized statements from respondents indicating rationalization techniques of denial of an injury, condemnation of condemners, and denial of negative intent.

Although information extracted from the case files did not definitively point to instances where the subject engaged in conduct in order to restore a perceived loss of equity in a dyadic

relationship, some of the phrases taken from the case files suggest possible motivation by the subjects that could indicate retaliatory conduct in response to perceived exploitation. For example, some of the subjects said that they falsified data in order to annoy colleagues or that they were not recognized for their scientific expertise. Other subjects discussed competition in relation to positions within the university or institution and competition for submitting papers for publication.

Implications for Prevention

If we look at the preliminary evidence for our theoretical questions, we can infer some tentative implications for prevention. Information pertaining to lack of proper supervision or training suggests that it might be prudent for universities to implement better procedures and guidelines for supervisors with respect to employee oversight and monitoring responsibilities. We found some support that periodic reviews or audits of research notebooks, as well as the original data collected for all experiments, by the supervisor may help to reduce research misconduct. Ensuring that

Denial of an Injury	Condemnation of the Condemners	Denial of Negative Intent
No harm done because the experiments were preliminary, unimportant, and had not been published	Subject had opposite and competing opinions to research performed by colleagues of the complainant	Fabricated sampling times were preliminary and never intended to be published
Worked on several of the articles which were used as references for the proposal and therefore permitted to incorporate these materials into the proposal	Allegations by complainant were an attempt to "get rid of" the subject from the University	Going to tell supervisor the truth after the subject had a chance to obtain valid counts, but the subject didn't have the chance
If there was some faulty reporting of findings, that it was minimal since it was not the central issue of the study		

Table 2. Etiology - Neutralization Techniques

employees are properly trained on all experimental techniques prior to performing such experiments could also help reduce the researcher's lack of knowledge on the subject matter, as well as apprehension about acknowledging that as a problem. Similarly, discussing the serious ramifications of research misconduct can also discourage some of the denial its perpetrators use to rationalize their actions with such conduct; for example, that there indeed is harm associated with these actions that affects a variety of actors and institutions, including, most importantly, the patient population.

The three interviews conducted to date have also provided some insights for prevention. One subject credited the careful handling of data for his own demise:

"...when the technician did the, you know, do the random stuff, yes, there would be a copy on the computer, but he would also print out the data, you know, a paper copy and put that into their books. So, it was, you know, like, it was also like a guarantee that I would eventually be found out and that it could all be

traced back."

So upon his returning to the lab from an extended trip:

"...basically they sat me down and confronted me with the fact that these data sets don't fit. And, it was a situation of, uh, what do you say if you're caught red-handed? You know all the original data was there. It was very easy for them to go back to the original sets and see that there were discrepancies."

This same interviewee briefly contemplated trying to cover up the misconduct, but again realized:

"...it was truly a situation where the record keeping system that I had set up was such that there was no way I could possibly go back through all the computer files and alter those. There was, you know, everything, the techs had always printed out paper copies, so there was shelves of three ring binders with all the data. It was a situation of, it can't be done."

One interviewee felt that training might help prevent some research misconduct:

"I think that there should be more training, study in just the basics of the scientific method and, you know, what is appropriate, you know,

Evidence of possible motivation to retaliate	Evidence of possible motivation to exploit
Made up data to annoy a colleague	Future dependent on rapid success in the laboratory
Some friction between subject and others in the lab	Laboratory placed too much emphasis on short-term productivity
Bitter relationship between subject and supervisor	Competitive pressure for tenure-track positions
Failed to make changes because upset with others	Insecure position
Attempt to get rid of subject	
Personal animosity against the subject/Prejudice against the subject	

Table 3. Etiology - Equity Theory

what is not appropriate in terms of experimental methodology, in terms of statistics, in terms of, if you're going to discard data, you know, what are the other experimental reasons for discarding the data? For example, oh yeah, I had a sudden sneeze and I sneezed and I botched test tubes or I knocked over this particular test tube, or I tested this particular agent and found that, oh my gosh, I actually added 10 times the amount of a particular component, you know, those are valid reasons for discarding data. You know, I don't think there's enough emphasis placed on teaching people the proper scientific method."

Another subject offered what he referred to as an "easy" solution to the problem of fabrication and falsification:

"What you do, is you have, uh, open laboratory meetings where everyone in the laboratory knows what everyone else is doing. Uh, you say you did an experiment that took a hundred rats, but only five rats came into the, into the lab, it's pretty clear that you didn't do a hundred rats. Uh, if you're not there doing the work, uh, that people think you're doing or know that you're supposed to be doing, uh, so I think, uh, open laboratories, with regular, uh, presentations of data prevent that."

Conclusions

We used a qualitative approach to explore selected aspects of individual-level etiology of research misconduct. These preliminary data offer some tentative support for our theoretical perspectives. More definitive conclusions will have to await the collection and analysis of the data from the larger study.

This research-in-progress also offers support for certain forms of prevention. These suggestions, rather than the product of well-meaning, but less-than-well-informed commentators, come from those most intimately involved in actual cases. Returning to the analogy of crime, learning from those who have engaged in research misconduct is not unlike debriefing convicted burglars on what would have kept them from choosing a particular dwelling as a target. Who should know better than those who have done it?

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